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Neighborhood Factors and Language Outcomes of First Nations Preschoolers Living Off Reserve: Findings from the Aboriginal Children's Survey

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Abstract
Language skills in the preschool period are an important indicator of early development and school readiness for children. However, little is known about the association between aspects of the neighborhood and language outcomes for First Nations children. The purpose of the current study was to examine the effects of neighborhood structural and organization features, as well as the mediation of these effects, on the language outcomes of First Nations children aged 2-5 living off reserve. Data from the Aboriginal Children's Survey was examined. Both neighborhood structure and neighborhood organization were important for language outcomes. In addition, mediation effects were shown, suggesting that family-level as well as neighborhood structural variables are particularly important for the language outcomes of young First Nation children living off reserve.

Keywords
language, children, First Nations, neighborhood, Aboriginal Children's Survey

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Neighborhood Factors and Language Outcomes of First Nations Children Living Off Reserve: Findings from the Aboriginal Children's Survey

Language skills are an important indicator of early development for preschool children. Lower verbal abilities in the preschool period limit communication with adults and peers and have been associated with reduced school readiness and poor academic performance (Duncan et al., 2007; Justice, Pence Turnbull, Bowles, & Skibbe, 2009; Sabol & Pianta, 2012; Silva, Williams, & McGee, 1987; Young et al., 2002), as well as less social competence (Longoria, Page, Hubbs-Tait, & Kennison, 2009). Language problems are among the most prevalent developmental delays facing Aboriginal children (Findlay & Janz, 2012). Furthermore, rates of speech and language problems (de Leeuw, Fiske, & Greenwood, 2002; Minister of Public Works and Government Services, 2000) and risks of decreased school readiness (Ball, 2009) are higher among Aboriginal children as compared to non-Aboriginal children. However, important markers of language ability for Aboriginal children, such as mutual understanding (Hoff, 2006; Kaulbeck, 1984) and storytelling (Ball & Janyst, 2008; Bernacki Jonk, 2009; Gould, 2007) have not typically been examined. The purpose of the current study is to examine child, family, and neighborhood influences on language outcomes[1] for young First Nations children living off reserve in Canada.

Correlates of Children's Language Outcomes in the General Literature

It is well documented that family disadvantage, including deprived socio-economic conditions, is associated with poorer early childhood outcomes including language (Duncan, Brooks-Gunn, & Klebanov, 1994; Janus & Duku, 2007; Leventhal & Brooks-Gunn, 2000). Lower levels of family income and maternal education, single marital status, and a greater number of children in the family have been shown to be significantly associated with lower language scores for children in general (Hoffe, 2003; Qi, Kaiser, Milan, & Hancock, 2006; Taylor, Dearing, & McCartney, 2004). In addition to these proximal effects on child development, a growing body of literature has emerged supporting the notion that neighborhood factors are important for young children's outcomes even after considering family-level socio-economic characteristics (Carpiano, Lloyd, & Hertzman, 2009; Kohen, Brooks-Gunn, Leventhal, & Hertzman, 2002; Lapointe, Ford, & Zumbo, 2007; Leventhal & Brooks-Gunn, 2000; Romano, Tremblay, Boulerice, & Swisher, 2005). Neighborhood effects are important since they suggest that the community in which the child resides is also important over and above individual and family level factors. The fact that there are such neighborhood effects may be somewhat surprising since preschool-aged children's experience with the neighborhood is largely dependent on parental choices for child participation in programs, activities, and childcare (Bronfenbrenner & Morris, 1998).

Both *structural* aspects, as well as neighborhood *organization* factors, have been shown to impact children's early outcomes. Structural aspects refer to socio-economic characteristics, such as the mean household income of individuals, proportion of unemployed people, and proportion of those with less than high school levels of education within the neighborhood (Kohen, Leventhal, Dahinten, & McIntosh, 2008). Organizational aspects of the neighborhood include measures of safety, opportunities for civic engagement, and neighborhood activities and may reflect the social ties, shared values, relationships with others, and network opportunities within the neighborhood (Leventhal & Brooks-Gunn, 2000).

Effects of Neighborhood Structure on Children's Outcomes

Previous studies have shown that neighborhood structural features are associated with child outcomes, particularly language outcomes, independent of family-level factors, such as household income and maternal education (Barbarin et al., 2006; Chase-Lansdale & Gordon, 1996; Oliver, Dunn, Kohen, & Hertzman, 2007).

[1] While speaking and understanding an Aboriginal language is an important area of study, the focus of the present work is on general language development, thus we consider the development of language skills and abilities in any language (English, French, Cree, etc.) and not language skills of speaking an Aboriginal language specifically.

Studies utilizing the teacher-reported Early Development Index (EDI) have shown that children's language scores are related to neighborhood affluence (i.e., more affluent families within a community are associated with higher language ratings) (Carpiano et al., 2009), while an increased proportion of lone parent families and of those unemployed in the neighborhood are associated with poorer preschool language ratings (Kershaw, Forer, Irwin, Hertzman, & Lapointe, 2007). Neighborhood socio-economic factors and male unemployment are also associated with standardized language measures, such as the Peabody Picture Vocabulary Test (PPVT) (Dunn & Dunn, 1981), over and above family characteristics, with low socio-economic status (Vaden-Kiernan et al., 2010) and unemployment (Chase-Lansdale & Gordon, 1996) associated with low scores.

Effects of Neighborhood Organization on Children's Outcomes

Evidence also suggests that it is not only structural features that are influential. Neighborhood social organization, such as problems like litter, drugs, and burglaries (Romano et al., 2005), as well as safety and a sense of belonging (Edwards & Bromfield, 2009) have an impact on children's outcomes, and they are not necessarily proxies of neighborhood structural features (Kohen et al., 2002). Barbarin and colleagues (2006) found that neighborhood safety remained positively associated with language skills in preschoolers, after considering family-level factors such as marital status and socio-economic resources. Furthermore, lower ratings of neighborhood disorder (observer-rated physical and social surroundings of the neighborhood) and higher ratings of neighborhood cohesion have been associated with higher verbal ability scores, even after controlling for family and neighborhood socio-demographic characteristics (Kohen et al., 2002).

Mediated Effects for Neighborhood Factors

It is possible, however, that the effects of neighborhood structural disadvantage are mediated or explained by more complex family-level or neighborhood organizational factors. Other work has suggested that neighborhood structural disadvantage is not directly associated with verbal scores for preschoolers. Rather, these associations are manifested via indirect pathways between neighborhood organization and family processes, such as family functioning, mental health, and parenting behaviors (Kohen et al., 2008). This would suggest that the effects of living in a socio-economically disadvantaged neighborhood can be explained by processes within a neighborhood, such as its organization and family-level processes (i.e., parental mental health and parenting behaviors).

The Neighborhoods Where Off-Reserve First Nations Children Live

Studies of the impact of neighborhood features on child language outcomes have largely focused on non-Aboriginal children. However, it is important to provide a context for the current study by describing the neighborhoods of First Nations children. These neighbourhoods are generally distinctively different from those where non-Aboriginal children live, in particular with respect to socio-economic characteristics and housing (Indian and Northern Affairs Canada, 2010). Findings from the 2006 Census of Canada suggest that, compared to the non-Aboriginal population, First Nations people living both on and off reserve are more likely to live in over-crowded homes in need of repairs (Gionet, 2009). Household size, however, may be positively associated with greater use of an Aboriginal language in the home (Guèvremont & Kohen, 2012). Evidence also suggests that First Nations people are more likely to move, either within the same neighborhood or to a different neighborhood, than are non-Aboriginal people (Statistics Canada, 2008b). High levels of neighborhood mobility are suggested to impede social organization (Kershaw et al., 2007) and have also been shown to have a negative association with early language outcomes (Oliver et al., 2007). Moreover, Chandler and Lalonde's (2008) work has pointed to the particular importance of cultural factors in the community (i.e., involvement and cultural facilities) for the well-being of First Nations youth, a feature that is largely ignored in studies examining the impact of neighborhoods on children's outcomes.

While the empirical research examining associations of neighborhood factors on First Nations children's language outcomes is limited, existing evidence suggests that neighborhood features are important. A study by Kershaw and colleagues (2007) found that the proportion of people in the neighborhood that identified as Aboriginal was associated with an increased teacher-reported EDI "vulnerability" in communication and general knowledge. Kohen and colleagues (Kohen, Oliver, & Pierre, 2009) also found that teacher-rated language and cognitive development (measured by the EDI) was lower if the child lived in a neighborhood with a greater proportion of Aboriginal people. In contrast, other studies have not found that the proportion of Aboriginal people in the neighborhood was related to preschool outcomes as measured by EDI scores (Carpiano et al., 2009; Lapointe et al., 2007; Lloyd & Hertzman, 2010) nor to standardized preschool language outcomes (Kohen et al., 2009). It is possible, however, that the effect of the proportion of Aboriginal people in the neighborhood is confounded by neighborhood disadvantage (Lapointe et al., 2007) or by the assessment measures used. For example, standardized language measures have been viewed as being inappropriate for Aboriginal children since they were not developed with or validated for Aboriginal children in mind nor validated for them (Ball, 2007).

Methods

Despite the extant literature supporting the associations between neighborhood characteristics and children's outcomes, less is known about the associations between neighborhood factors (mediated and non-mediated) and outcomes for First Nations children living off reserve in Canada. Thus, the purpose of the current study was twofold: (a) to examine the effects of neighborhood characteristics (structure and organization) on the language outcomes of First Nations children living off reserve, and (b) to explore possible mediation of these effects by family-level socio-economic and neighborhood factors (organization, culture). We include two outcome measures especially relevant for First Nations children living off reserve: mutual understanding and story-telling. It was hypothesized that neighborhood structural characteristics, in particular, the mean level of household income in the neighborhood, would be positively associated with children's language outcomes whereas factors such as having less than a high school education, being unemployed, moving frequently, and living in housing in need of repairs would be negatively associated with language outcomes. In addition, measures of social organization, such as perceived neighborhood safety, involved neighborhood members, and the opportunity for Aboriginal cultural activities, were anticipated to be positively associated with language outcomes. Consistent with existing research (Kohen et. al., 2008; Xue, Leventhal, Brooks-Gunn, & Earls, 2005), family characteristics (i.e., income, education) and neighborhood organization were also anticipated to mediate some of the structural neighborhood-level effects for off-reserve First Nations children's language outcomes.

Sample

Data from the Aboriginal Children's Survey (ACS) were used to examine the language outcomes of First Nations[2] children aged 2- 5 years living off reserve. The ACS was developed by Statistics Canada with input from government departments, as well as Aboriginal advisors from across the country. It was conducted by Statistics Canada and sponsored by Human Resources and Skills Development Canada to assess the early development of Aboriginal children and the social and living conditions in which they are learning and growing. The ACS target population consisted of First Nations children living off reserve, Métis children, and Inuit children living in the 10 provinces, as well as all children living in the three territories. The survey did not cover children living on reserves in the provinces; however, all Aboriginal children living in the territories and some First Nations communities in Quebec were included. The sample was selected from children under the age of 6 who were identified in the 2006 Census of Canada as North American Indian, Métis, Inuit, a treaty or registered Indian, a member of a First Nation Band, or having Aboriginal ancestry. The overall response rate to the ACS was 81% with a sample size of 12,845 children, representing a population of

[2] In the ACS, children were identified as *North American Indian*; however, the term *First Nations* is used throughout this report.

approximately 135,000 Aboriginal children under age 6 in Canada. Further information on the sample and survey is available elsewhere (Statistics Canada, 2008a). For the current study, children who reported single or multiple First Nations identity and were aged 2 to 5 were included in the study sample (n =3,622). Children living on reserve were not included in the ACS sample; thus, the results cannot be generalized to the on-reserve population.

Measures

Family and child socio-demographic characteristics. The person most knowledgeable about the child (the biological mother or father in 90% of cases and hereafter called the parent or guardian) reported on the child's age, sex, and status (registered or not registered). The parent or guardian also provided information on the parent's education (high school graduation or greater versus less than high school graduation) and marital status (single versus dual parent), as well as the region in which they lived (province, urban or rural) and the number of people residing in the household. Household income was obtained from the 2006 Census of Canada.

Neighborhood structure. Information about the neighborhood was available from the 2006 Census of Canada and is representative at the dissemination area (DA)[3] level (derived from the child's postal code). Based on previous research (Carpiano et al., 2009; Kohen et al., 2002; O'Brien Caughy & Campo, 2006; Oliver et al., 2007), neighborhood-level socio-demographic characteristics of interest included the following: (a) the proportion of the neighborhood with less than a high school level of education (among those aged 25-64 years), (b) the proportion unemployed (aged 25 years and over), (c) the proportion who had moved in the past year, (d) the proportion living in housing in need of minor or major repairs, and (e) mean household income controlling for household size.

Neighborhood organization. The parent or guardian was asked how he or she felt about the neighborhood: (a) safety, (b) involvement of members, and (c) as a place with First Nations, Métis, and Inuit cultural activities. Response options included *excellent*, *very good*, *good*, *fair*, and *poor*. As in previous research (Kohen & Oliver, 2010), due to skewed distributions, responses were dichotomized to reflect high (*excellent, very good,* and *good*) versus low (*fair* and *poor*) ratings.

Language. Several parent-reported indicators of children's language outcomes were collected, including expressive language, mutual understanding of language, storytelling, and the presence of any speech or language difficulties. Subscales were derived based primarily on a factor analysis of the items, yielding 4 factors (Findlay & Kohen, in press). For expressive language, parents were asked how often the child used full sentences, two to three words, single words, and sounds (*all of the time, most of the time, sometimes, or rarely*). These four items were used to create a continuous measure of *expressive language* with a score of 16 indicating that the child used sentences all of the time and a score of 1 indicating that sounds were rarely used. A mean score of *mutual language understanding* was generated from three questions, including parent's responses as to the child's understanding when the parent speaks to the child, how often the parent can understand the child, and how often other people can understand the child (*all of the time, most of the time, sometimes, rarely, or never*). *Story-telling* was based on a mean score created from parent's responses as to whether or not the child had ever told or retold a story using his or her own words and whether he or she had ever drawn a picture and told a story about it. For regression analyses, expressive language, mutual understanding, and story-telling scores were all normalized due to the high mean scores achieved and skewed distributions (i.e., ceiling effects). Finally, from a list of chronic conditions known to affect young children, parents were asked whether or not the child had any *speech or language difficulties* (yes or no). If a speech or language difficulty was reported, the parent was also asked whether or not the child had received a diagnosis from a medical professional. If the condition had been diagnosed, parents were also asked whether or not the child had received any treatment.

[3] Dissemination areas are small geographic areas with a population between 400 and 700 people and are used as a proxy for neighborhoods (Kohen et al., 2002, 2008).

More detailed information on how the language outcomes were derived is available elsewhere (Findlay & Kohen, in press).

Analysis

Descriptive statistics on the family and neighborhood socio-economic characteristics of the sample and the language outcomes were performed. Multivariate linear regression was performed for three of the four outcome variables (expressive language, mutual understanding, and story-telling); logistic regression was conducted to examine significant predictors of the presence of a speech and language difficulty. Predictor variables of interest for all four outcomes included two sets of variables: (a) neighborhood structural features (proportion with less than a high school education, proportion unemployed, proportion of lone parent families, proportion living in housing in need of repairs, mean household income in the neighborhood, and proportion in the neighborhood who had moved in the past year); and (b) neighborhood organization (ratings of neighborhood safety, actively involved members, and as a place with First Nations, Métis, or Inuit activities). Control variables included in the analyses were child-level (child's sex, age, and registered Indian status) and family-level (family type: two parent versus lone parent), parental education (high school graduation versus less than high school), household income, household size, and urban or rural dwelling) variables.

For all four outcomes (expressive language, mutual understanding, story-telling, and speech and language difficulties), a series of regression models were performed. Child-level variables were included in all models, since factors relating to the child were considered to be unchanging yet important for the outcomes examined. First, in two separate models, we examined associations of neighborhood structural features and neighborhood organization variables on each of the four language outcomes (unadjusted models 1 and 2, respectively). Next, family-level variables were added to examine the associations of neighborhood structure and organization over and above the associations of the family socio-economic features (models not shown). In a final model (adjusted), all variables (family, neighborhood structure, and neighborhood organization) were included simultaneously to examine mediation. The final models considered the associations of neighborhood structural factors above all other organizational factors (child, family, and neighborhood)[4].

Survey sampling weights were applied to account for the complex survey design and to render the analyses representative of the off-reserve First Nations population in Canada. Finally, a bootstrapping technique was applied to produce estimates of variance (Rust & Rao, 1996).

Results

Approximately half of the children were male (51%) and 58% had registered Indian status. The majority of First Nations children aged 2 to 5 living off reserve lived with two parents (60%). Approximately 70% had parents who had completed high school or more, and almost 4 out of 5 (78%) children lived in an urban area with a mean household size of 4.38 (*SE* = 0.03) and mean household income of $49,631 (*SE* = 744.61).[5] In describing the neighborhoods in which First Nations off-reserve children live, on average, 22% of neighborhood members had less than a high school level of education, 7% were unemployed, 18% of the neighborhood had moved in the past year, and 42% of neighborhood members lived in housing that was in

[4] Additional mediation models examining family, neighborhood structure, and neighborhood organization variables are available upon request.

[5] To compare to the National Longitudinal Survey of Children and Youth Cycle 7 (2006, custom tabulation), 52% of Canadian children aged 2-5 were male, 86% lived with two parents, 92% had parents who had completed high school or more, 78% lived in an urban area, and the mean household income was $73,260 (*SE* = 612.35).

need of repairs.[6] In terms of neighborhood perceptions, the majority of children had parents who perceived the neighborhood as being safe (77% reported excellent, very good or good) and having actively involved members (78% reported *excellent, very good* or *good*).[7] However, less than half (43%) of children had parents who felt that the neighborhood was a place with Aboriginal cultural activities.

In general, First Nations children received high scores on expressive language, mutual understanding, and story-telling[8] (expressive language: $M = 14.97$, $SE = 0.04$, range 1-16; mutual understanding: $M = 4.48$, $SE = 0.01$, range 0-5; story-telling: $M = 0.83$, $SE = 0.01$, range 0-1). Approximately 13% of First Nations children aged 2 to 5 living off reserve were reported by their parent or guardian as having a speech and language difficulty. Of those who were reported to have a difficulty, about three quarters had received a diagnosis from a medical professional (76%), and, of those diagnosed, just over four out of five had received treatment (83%).

Regression Results

Socio-demographic variables. Across all four language outcomes, boys and younger children were found to have lower language scores (see Tables 1-4).[9] Parental education (high school education or greater) was positively associated with expressive language (Table 1), mutual understanding (Table 2), and story-telling (Table 3) outcomes. Household income was positively associated with expressive language (Table 1) and mutual understanding (Table 2) and with lower odds of a speech and language difficulty (Table 4); whereas, household size was negatively associated with language outcomes (see Tables 1-3) and also associated with higher odds of speech and language difficulties (Table 4). Living with a single parent and urban (versus rural) dwelling were not significantly associated with any of the language outcomes.

Neighborhood structure. The associations of neighborhood-level structural variables and each of the language outcomes were examined, first unadjusted, then adjusted for family-level variables, and finally all factors were included in a full model simultaneously.

Neighborhood education level. As shown in Tables 1-4, there was an association between neighborhood education and First Nations children's language outcomes. Children who lived in a neighborhood with a greater proportion of people with less than a high school education had lower expressive language scores and lower story-telling scores. This association remained significant even after controlling for family-level socio-economic and neighborhood organization variables.

Neighborhood employment. As shown in Tables 2 and 4, contrary to expectations, the proportion of the neighborhood that was unemployed was related to higher mutual understanding scores and fewer reported speech and language difficulties. These associations remained significant in the final model including family-level and neighborhood organization factors. Thus, living in a neighborhood with a greater proportion of people who were unemployed was associated with higher mutual understanding scores and lower odds of speech and language difficulties for First Nations children living off reserve.

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[6] To compare to the 2006 Census of Canada, on average, 16% of all neighborhood members in Canada had less than a high school level of education, 6% were unemployed, 13% of the neighborhood had moved in the past year, and 36% of neighborhood members lived in housing that was in need of major or minor repairs.

[7] 68% of parents felt that the neighborhood was safe *and* there were actively involved members in the neighborhood.

[8] A by-age examination of the data indicated that mean scores increased with age. This finding suggests that, as expected, older children were more likely to use more complex forms of language, providing some construct validity for the measure. As would be expected, children with speech and language difficulties were reported to have lower scores on all three of the language outcomes.

[9] Child registered status was associated with some of the language outcomes, with non-status being associated with better outcomes. However, this effect was partially accounted for by family-level variables. Further research specifically investigating associations between registered status and language outcomes is warranted.

Table 1. Linear Regression Predicting Expressive Language, First Nations Children Aged 2-5 Living Off Reserve (*n* = 3,622)

	Model 1		Model 2		Full Model	
	Unadjusted		Unadjusted		Adjusted	
	Beta	SE	Beta	SE	Beta	SE
Child level						
Male	**-0.25***	0.03	**-0.26***	0.04	**-0.28***	0.04
Age (in months)	**0.02***	0.00	**0.02***	0.00	**0.02***	0.00
Status	**-0.15***	0.04	**-0.16***	0.04	**-0.10***	0.04
Family level						
Single parent					-0.03	0.04
High school education or greater					**0.19***	0.05
Household income					**0.02***	0.00
Household size					**-0.05***	0.02
Urban					-0.02	0.06
Neighborhood structure						
Proportion with less than high school education	**-0.05***	0.02			**-0.05***	0.02
Proportion unemployed	0.00	0.03			0.01	0.03
Proportion of lone parent families	0.00	0.01			0.01	0.01
Proportion of housing in need of repairs	-0.02	0.01			0.00	0.02
Average household income	0.02	0.01			0.00	0.02
Proportion mobile in last year	-0.01	0.02			0.00	0.02
Neighborhood organization						
Community as a safe place			**0.11***	0.05	0.07	0.06
Community actively involved			0.06	0.05	0.02	0.06
Community as a place with Aboriginal activities			-0.02	0.04	0.01	0.04

Source: Aboriginal Children's Survey 2006, Statistics Canada

*$p \leq .05$.

Table 2. Linear Regression Predicting Mutual Understanding, First Nations Children Aged 2-5 Living Off Reserve (*n* = 3,622)

	Model 1		Model 2		Full Model	
	Unadjusted		Unadjusted		Adjusted	
	Beta	SE	Beta	SE	Beta	SE
Child level						
Male	**-0.25***	0.03	**-0.27***	0.04	**-0.28***	0.04
Age (in months)	**0.03***	0.00	**0.03***	0.00	**0.03***	0.00
Status	**-0.14***	0.04	**-0.16***	0.04	**-0.11***	0.04
Family level						
Single parent					-0.01	0.04
High school education or greater					**0.14***	0.05
Household income					**0.02***	0.00
Household size					**-0.06***	0.02
Urban					0.06	0.06
Neighborhood structure						
Proportion with less than high school education	-0.03	0.02			-0.02	0.02
Proportion unemployed	**0.07***	0.03			**0.07***	0.03
Proportion of lone parent families	0.00	0.01			0.01	0.01
Proportion of housing in need of repairs	**-0.03***	0.01			-0.03	0.02
Average household income	0.02	0.02			-0.01	0.02
Proportion mobile in last year	-0.01	0.02			0.00	0.02
Neighborhood organization						
Community as a safe place			**0.16***	0.05	**0.11***	0.05
Community actively involved			0.01	0.05	-0.02	0.05
Community as a place with Aboriginal activities			0.07	0.04	**0.10***	0.04

Source: Aboriginal Children's Survey 2006, Statistics Canada

*$p \leq .05$.

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Table 3. Linear Regression Predicting Story-Telling, First Nations Children Aged 2-5 Living Off Reserve (*n* = 3,622)

	Model 1		Model 2		Full Model	
	Unadjusted		Unadjusted		Adjusted	
	Beta	SE	Beta	SE	Beta	SE
Child level						
Male	**-0.23***	0.03	**-0.25***	0.03	**-0.25***	0.04
Age (in months)	**0.03***	0.00	**0.03***	0.00	**0.03***	0.00
Status	**-0.09***	0.03	**-0.11***	0.04	-0.05	0.04
Family level						
Single parent					-0.06	0.04
High school education or greater					**0.12***	0.05
Household income					0.00	0.00
Household size					**-0.05***	0.01
Urban					0.00	0.05
Neighborhood structure						
Proportion with less than high school education	**-0.08***	0.02			**-0.06***	0.02
Proportion unemployed	-0.04	0.03			-0.03	0.03
Proportion of lone parent families	-0.01	0.01			0.01	0.01
Proportion of housing in need of repairs	0.00	0.01			0.01	0.01
Average household income	-0.02	0.01			-0.01	0.02
Proportion mobile in last year	-0.02	0.02			-0.04	0.02
Neighborhood organization						
Community as a safe place			**0.14***	0.05	0.07	0.06
Community actively involved			0.08	0.05	0.05	0.05
Community as a place with Aboriginal activities			-0.03	0.04	-0.01	0.04

Source: Aboriginal Children's Survey 2006, Statistics Canada

*$p \leq .05$.

Table 4. Logistic Regression Predicting Speech and Language Difficulties, First Nations Children Aged 2-5 Living Off Reserve (*n* = 3,622)

	Model 1			Model 2			Model 3		
	Unadjusted			Unadjusted			Adjusted		
	OR	95% CI		OR	95% CI		OR	95% CI	
Child level									
Male	**2.37***	1.91	2.94	**2.46***	1.95	3.10	**2.59***	2.02	3.32
Age (in months)	**1.02***	1.02	1.03	**1.02***	1.01	1.03	**1.02***	1.01	1.03
Status	1.12	0.88	1.42	1.05	0.82	1.34	0.93	0.71	1.22
Family level									
Single parent							1.09	0.83	1.44
High school education or greater							0.81	0.60	1.08
Household income							**0.95***	0.91	0.99
Household size							**1.10***	1.01	1.19
Urban							1.19	0.82	1.72
Neighborhood structure									
Proportion with less than high school education	1.10	0.99	1.22				1.08	0.96	1.22
Proportion unemployed	**0.71***	0.59	0.86				**0.72***	0.59	0.89
Proportion of lone parent families	**0.91***	0.85	0.99				**0.90***	0.82	0.98
Proportion of housing in need of repairs	1.06	0.98	1.16				1.05	0.94	1.16
Average household income	0.89	0.79	1.00				0.95	0.84	1.08
Proportion mobile in last year	1.04	0.94	1.15				1.07	0.95	1.21
Neigborhood organization									
Community as a safe place				0.99	0.73	1.36	1.03	0.73	1.44
Community actively involved				0.91	0.66	1.24	0.91	0.66	1.27
Community as a place with Aboriginal activities				**0.73***	0.57	0.93	**0.76***	0.58	0.98

Source: Aboriginal Children's Survey 2006, Statistics Canada

*$p \leq .05$.

Neighborhood lone parent families. First Nations children living off reserve who lived in a neighborhood with a high proportion of lone parent families were reported to have lower odds of speech and language difficulties (Table 4). This association remained even when parental and other neighborhood-level factors were considered in the model.

Neighborhood housing in need of repairs. Finally, living in a neighborhood with a higher proportion of housing in need of repairs was associated with lower mutual understanding (Table 2) for First Nations children living off reserve. This association remained significant when family-level factors were considered, but the association

was not significant in the final model, suggesting that living in a neighborhood with a higher proportion of housing in need of repairs was mediated by neighborhood organization variables, such as safety and having Aboriginal activities available (see Table 2).

Neighborhood mean household income[10] and mobility in the neighborhood did not emerge as significant predictors of children's language outcomes.

Neighborhood organization. The final block of variables examined the effect of perceptions of neighborhood organization on language outcomes.

Safety. Parental perceptions of the neighborhood as a safe place was positively associated with expressive language (Table 1), mutual understanding (Table 2), and story-telling (Table 3); however, these associations remained significant in the final models including family-level socio-demographics and neighborhood structure factors only for mutual understanding (Table 2). Therefore, safety in the neighborhood had a positive association on mutual understanding over and above family and neighborhood factors. For expressive language (Table 1), the association with safety was no longer significant once the family-level and neighborhood structure variables were added. For story-telling (Table 3), the association with neighborhood safety was no longer significant when neighborhood structure was added to the model, suggesting that story-telling behavior was positively associated with neighborhood socio-economic factors (i.e., education).

Aboriginal activities. Parental perceptions of the neighborhood as a place with Aboriginal activities demonstrated a trend towards a positive association with mutual understanding (p=.056; Table 2). This association was significant in the final model over and above controls for family socio-demographics and neighborhood structure. Parental perceptions of Aboriginal activities in the neighborhood were also associated with lower odds of speech and language difficulties (Table 4) in both an unadjusted model and over and above family and neighborhood structure variables. These findings suggest that First Nations children living in a neighborhood with Aboriginal activities have better mutual understanding scores and lower odds of speech and language difficulties.

Discussion

One of the unique features of the present study is that it is one of the first Canadian population-based studies to describe speech-language outcomes for First Nations children living off reserve. Approximately 13% of First Nations children living off reserve aged 2-5 years were reported by their parents as having a speech and language difficulty, with three quarters of those children reported as being diagnosed by a medical professional, and just over four out of five of those diagnosed having received treatment. Using a different measure, the Canadian Association for Speech and Language Pathology estimated that 4% of Canadian children are reported to have a speech and language difficulty (CASLPA-ACOA, 2010); in the U.S., the National Institute on Deafness and Other Communication Disorders (NIDCD) estimates the prevalence of speech-sound disorder in young children to be 8% to 9%. The current findings, as well as reports by Ball (2006, 2007) and others, suggest that speech and language issues are especially prevalent in First Nations children. If one considers potential difficulties in access to diagnosis and treatment, this may suggest an under-estimation of speech and language problems among Aboriginal children in this study. Information regarding access to speech and language services was not available in the ACS, thus further work examining access to services and language outcomes for First Nations children is warranted.

Parental education and income were positively associated with language outcomes; however, household size, or a greater number of children and adults in the household, was negatively associated with language

[10] The reader is reminded that a measure of continuous household income adjusted for household size was employed in the current study, which is not intended to indicate affluence or poverty. However, when measures of the proportion that were affluent and the proportion that were living in poverty were investigated, the results remained unchanged.

outcomes. The results of the study suggest that aspects of the neighborhood also have an important association with First Nations children's language outcomes. In terms of neighborhood structure, associations were found for four of the neighborhood-level socio-economic factors. The proportion of the neighborhood with less than a high school education was negatively associated with expressive language and story-telling, suggesting that neighborhood education level has a role in children's early language outcomes. Previous work has not shown particularly strong associations of neighborhood education for children in general (Chase-Lansdale & Gordon, 1996; Kershaw et al., 2007; Lapointe et al., 2007); however, neighborhood education level has been shown to be particularly relevant in studies of First Nations children living off reserve (Kohen & Oliver, 2010). This is an area that warrants further research.

Additional neighborhood structural features, such as living in a neighborhood with a higher proportion of housing in need of repairs, were associated with lower mutual understanding outcomes for First Nations children living off reserve. This association was found to be mediated by neighborhood organization variables (safety and neighborhood as a place with Aboriginal activities). Additional correlation analyses revealed that housing conditions was negatively associated with both safety ($r = -.14$, $p \leq .001$) and the neighborhood as a place with Aboriginal activities ($r = -.13$, $p \leq .001$), suggesting that First Nations children living off reserve in poor housing conditions also lived in neighborhoods which were reported as being less safe and less likely to offer Aboriginal activities and possibly other social resources (e.g., literacy programs, books, and other learning materials) (Ball, 2006).

Neighborhood unemployment was also associated with two of the language outcomes (mutual understanding and speech and language difficulties), but not in the expected direction. The proportion of the neighborhood that was unemployed was positively associated with mutual understanding and with fewer speech and language difficulties (even after considering family-level and neighborhood organization factors). This finding suggests that having unemployed persons in the neighborhood promotes greater mutual understanding and fewer speech and language difficulties. Previous work in the general population has not shown strong associations between neighborhood unemployment and Canadian children's outcomes (Kohen et al., 2002; Oliver et al., 2007). These differences may highlight particular associations for First Nations children for mutual understanding and may reflect the opportunities for additional language interchanges with adult speakers. However, household size (which may include more adults in the household) was negatively associated with language outcomes.[11]

Living in a neighborhood with a higher proportion of lone parent families was also associated with fewer speech and language difficulties. One possible explanation is that the proportion of lone parents and neighborhood unemployment may be associated with barriers to diagnosis or access to health services (Bradley & Corwyn, 2002). In fact, in subsequent exploratory analyses in which children with speech and language difficulties ($n = 462$) were divided into those that were diagnosed versus undiagnosed, this was confirmed with results in the hypothesized direction. That is, neighborhood unemployment was higher for those with undiagnosed as compared to those with diagnosed speech and language difficulties and a higher proportion of lone parent families in the neighborhood was associated with undiagnosed speech and language difficulties. This is an area warranting further research.

Turning to the organizational factors of the neighborhood, several associations with language outcomes were shown, some of which were mediated by family or neighborhood structure variables. Perceptions of neighborhood safety were positively related to expressive language, mutual understanding, and story-telling, although the associations were not maintained when family and neighborhood structure factors were included in the model. Neighborhood safety was found to be positively associated with parental education and income, and negatively associated with household size and the proportion of people in the neighborhood with less than a high school level of education. This would suggest that parents who rate their neighborhood as being a

[11] The correlation between household size and neighbourhood unemployment was relatively small ($r = .04$, $p \leq .05$).

safe place are also more likely to have higher incomes, be better educated, and live in smaller households, and these latter factors may explain why children in safe neighborhoods have higher expressive language scores.

Living in a neighborhood with Aboriginal activities available (43% of the sample) was beneficial for both mutual understanding and speech and language difficulties (over and above family-level and other neighborhood variables). It is possible that Aboriginal activities not only represent a marker for cultural participation within the neighborhood, but also of neighborhood cohesion for Aboriginal people (actively involved members was mildly, but significantly, correlated with cultural activities, $r = .27$, $p \leq .001$). Although the current study investigates language use in general, other work has suggested that speaking an Aboriginal language specifically may be a critical component of cultural engagement in terms of promoting well-being (Hallett, Chandler, & Lalonde, 2007). The current study extends the importance of neighborhood social organization to the language outcomes of First Nations children aged 2-5 living off reserve by suggesting that Aboriginal activities within the neighborhood are important, independent from other family and neighborhood characteristics such as family income or neighborhood socio-economic conditions. This unique finding reiterates the association between Aboriginal culture and off-reserve First Nations children's developmental outcomes.

To our knowledge, only one previous study has examined the effects of neighborhood structure and organization on off-reserve First Nations children's outcomes. Also using data from the Aboriginal Children's Survey, Kohen and Oliver (2010) found similar results in that neighborhood organizational characteristics, such as neighborhood safety, neighborhood involvement, and the perception of neighborhood facilities, were important for off-reserve First Nations children's mental health outcomes. These associations were also largely mediated by family-level factors, with maternal education being particularly important.

In the current study, the overall proportions of the variance explained in the final model for three of the language outcomes were approximately 20% (expressive language 17%, mutual understanding 19%, story-telling 22%). These results are somewhat higher than those reported in the general literature (Leventhal & Brooks-Gunn, 2000; Sellstrom & Bremberg, 2006). For speech and language difficulties, the explanatory power of the model was lower (overall $R^2 = 5\%$). This is not surprising given that we did not account for child health status or cognitive skills, which are particularly relevant to language difficulties.

Strengths and Limitations

The current study is unique in that it is the first to examine aspects of neighborhood structure and organization on language outcomes for First Nations children living off reserve. These language outcomes are particularly informative in that there were multiple parent-reported outcomes, which are not influenced by non-Aboriginal testers nor by the child's mother tongue being different from the test language (i.e., parents reported on child's use of any language and not necessarily English or French), and various components of language were targeted. Other strengths of this study include the use of a nationally-representative (off reserve) survey, the use of census-based neighborhood variables (i.e., not parent-reported), and the fact that we controlled for several family-level variables.

However, several limitations of the current study should be noted. First, it is likely that other family or neighborhood level variables, unaccounted for in the current study, such as parenting behaviors, parental mental health, and family functioning, are important mediators of neighborhood associations on language outcomes (Kohen et al., 2008). Similarly, while an attempt was made to include factors that would be important for First Nations children and families living off reserve, such as cultural involvement, we were limited by the items included in the ACS and it is possible that other factors are important contributors to children's language outcomes. In particular, previous work has shown that cohesion in the neighborhood can have implications for children's well-being, and, while the current study did include items which tapped into cohesion (neighborhood involvement, safety, and Aboriginal activities), future work might further investigate

this concept by including measures such as neighborhood ties and frequency of social interaction (Sampson, Morenoff, & Gannon-Rowley, 2002).

Second, our definition of a neighborhood may be restricted in that census-based dissemination areas, although commonly used, may not adequately represent communities for off-reserve First Nations people or may not be a reflection of individuals' perceptions of their neighborhood. Thus, perceptions of neighborhood organization may represent a different physical area than those included in the census measures of neighborhood structure. It is also possible that individuals may have moved (i.e., changed neighborhoods) between the census and the ACS data collection, and thus parent-reported neighborhood organization reflects a different neighborhood than the census-based measures of neighborhood structure. Also, neighborhood structure variables were census-based, whereas other markers of neighborhood structure (potentially parent-rated or observer-rated) might be of interest in future work. Finally, a theoretical perspective largely based on the general child development literature was used to frame this study. Certainly other frameworks may be relevant and warrant exploration.

These findings warrant replication in different countries. For example, in Australia the Western Australian Aboriginal Child Health Survey examined similar health factors as those in the ACS (e.g., Strength and Difficulties Questionnaire) and is a potential source of information on language outcomes for Aboriginal children internationally. The findings also suggest the importance of targeting policies at the neighborhood level which are likely to have an impact on young children's outcomes. Findings from this study reaffirm the importance of neighborhood education and cultural activities as being particularly relevant for language development.

Conclusions

It is interesting that, even in the preschool years, a period during which children are predominantly surrounded by family and are less likely to have direct neighborhood involvement, neighborhood associations are still evident. The results of the current study suggest that both neighborhood structure (e.g., proportion of the neighborhood with less than a high school education) and neighborhood organization (e.g., perceptions of safety and the presence of Aboriginal activities) are relevant for the early language outcomes of young First Nations children living off reserve. Future work replicating these results on different populations (e.g., children living on reserve or in different countries) is warranted, as well as studies investigating other potential mediators of these relationships. In addition, while the focus of the current study was on language outcomes, future work might consider the effects of the language spoken in the neighborhood as a neighborhood-level mediator. For example, it might be of interest to explore the discordance between language spoken in the home and language spoken in the neighborhood as being a potential neighborhood-based effect on children's healthy development. Finally, it would be of interest to explore a more comprehensive Aboriginal-specific measure of language, which might include other indices of language abilities, and associations of early language outcomes with later outcomes, such as education and employment. This might include qualitative work to explore the nuances of language for particular Aboriginal groups and children or to examine the effects of specific aspects of language on children's language development. In particular, qualitative work would allow more in-depth exploration of the specific neighborhood factors that influence young off-reserve First Nations children's language outcomes.

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